Smart virtual sensors for real-time assessment of Volcanic activity.

B. Andò [a)], M. Coltelli [b)], A. Cristaldi [b)], E. Pecora [b)]

a) Dipartimento di Ingegneria Elettrica Elettronica e dei Sistemi

University of Catania, V.le A. Doria 6, 95125, Catania, Italy

b) Istituto Nazionale di Geofisica e Vulcanologia, Sez. Catania, Italy

P.zza Roma, 2, 95100, Catania, Italy

Abstract

Monitoring is mandatory in hazardous areas with active volcanoes. South Italy countries are seriously affected by continuous risk of volcanic ash emissions, explosions and eruptions. In particular, Mt. Etna and Stromboli volcanoes requires great efforts by the scientific community to develop efficient monitoring systems. Several tasks in surveillance are already being managed by authority; anyway, innovative techniques are required to improve the performance of the monitoring task which is mandatory to improve the quality of public safety.

Synergy between competence on geophysical and engineer disciplines must be reinforced to develop monitoring systems aimed to increase information needed to promptly manage crisis arising from volcanic activities.

In this paper an innovative monitoring system is proposed. The system is based on smart virtual sensors, which assures real-time management of the volcanic activity by providing a large amount of information on the time evolution of the observed phenomena.

The system performs in two parallel tasks: the first aims to optimise the amount of the recorded data by a smart real-time processing of the gathered images and gives very rough set of information on the ongoing events (explosions, eruptions, ash emissions, etc.), while the second task is aimed to a deep analysis of the recorded data to compute statistic indexes characterizing the evolution of the volcanic activity observed (area, height, width, aspect ratio, magma flow rate, etc.).

The prototype of the proposed system is composed by a thermal camera sensor and a PC-based environment for data analysis. In particular, two computation tools were developed in the LabVIEW environment which provide the above mentioned information on the ongoing activity along with a smart processing of the acquired data. The system will be aimed to give useful information to the surveillance authority which, on the basis of the obtained results, can suitably manage the incoming events.